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HARNESSING THE SUN.

WHEN we sit in front of a coal fire and enjoy its generous warmth, do we realize that the heat and light of the burning coal are really sunshine that has been stored up for ages? Such is the fact. Centuries ago the sun shone on the earth and plants and trees grew, fell and grew again; they were covered by geologic deposits, and acted upon by great heat and pressure, until in the course of years or ages these broad layers of organic matter were transformed into coal. The coal thus represents the work done by the sunshine years ago, and when it is burnt the imprisoned solar energy is loosened again.

Our system of power-production depends upon this presence of energy. But coal is a wasteful source of energy. Even the best engines do not utilize over 10 per cent. of the calculated energy of the heat of coal. And, besides this, it is an inconvenient thing in many ways; it has to be mined, freighted, and stored. Can we not find some more economical way of using the sun's energy?

During the last few years the great progress in electrical science has enabled man to utilize the solar heat in a thriftier way. During its day's work the sun draws up a large amount of water from the oceans and the damp earth. By the action of its rays plant life flourishes, and plants draw from the ground and evaporate into the air large amounts of water. Thus an oak tree of average size, with 700,000 leaves, lifts from the earth into the air about one hundred and twenty-three tons of water during the five months it displays its foliage. This evaporated water, sooner or later, falls as rain, and by the action of gravity begins to flow downward. Thus the great rivers are fed. Round and round incessantly goes the water lifted by the tireless sun to fall when deserted by him, and again to be lifted, and again to fall and run seaward, as long as it may exist upon this earth.

In running downward water produces power, and the utilization of this power by water-wheels is one of the oldest of human ideas. But such a utilization was merely local; it could not be transmitted to a distance, and, as great falling bodies of water were not near large cities, these tremendous sources of power could not be rendered available. But now the Falls of Niagara are being utilized to run immense turbines, and these again to run dynamos, and the current thus produced can be sent by wire to distances which are continually increasing with the improvement of the means for conducting the power.

As the Sun makes no charge for pouring water into the upper end of the Niagara River, wastage of power is less serious than wastage of coal.

Still another opportunity of the same sort is not taken advantage of as yet. The Moon pulls the seas after her until the land stops their motion, and tides are the result. Few have any idea of the amount of power represented by the rise and fall of the tide. Twice a day does this stupendous exhibition of energy take place. But, as it is intermittent, it cannot be utilized as readily as a waterfall. It is not impossible to utilize the ebb of an immense mass of water for four or five feet; on the contrary many mechanical methods have been devised, and dynamos can be run as long as the tide is falling. But how shall the tidefall be made a source of continual power? Can electricity by the use of storage batteries, or in some other way solve the problem? It remains to be seen. Science has harnessed the Sun; now let her bridle the Moon. In this way the man of science will realize Emerson's phrase—"Hitch your wagon to a Star."

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